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# Report To The Congress

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Enewetak Atoll--Cleaning Up  
Nuclear Contamination



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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-165546

To the President of the Senate and the  
Speaker of the House of Representatives

The Enewetak Atoll project represents a unique attempt by the United States to clean up an area radioactively contaminated during nuclear tests and resettle the people. Enewetak Atoll, located in the Marshall Islands, is part of the Trust Territory of the Pacific Islands.

This report discusses the roles of the Federal agencies involved and identifies issues which should be resolved before the United States can consider the project finished.

This is a restricted report with limited distribution at this time since negotiations between the United States and the Marshall Islands Political Status Commission concerning the ending of the trusteeship agreement are currently in progress. It is therefore believed that release of this report while negotiations are in progress would not be in the best interest of the Government.

We are sending copies of this report to the Secretaries of Defense, the Interior, Energy, and State.

A handwritten signature in dark ink, appearing to read "James R. Smith".

Comptroller General  
of the United States

FURTHER RELEASE OF THIS REPORT MAY  
NOT BE IN THE BEST INTEREST OF THE  
GOVERNMENT FOR REASONS STATED HEREIN

COMPTROLLER GENERAL'S  
REPORT TO THE CONGRESS

ENEWETAK ATOLL--CLEANING  
UP NUCLEAR CONTAMINATION

D I G E S T

The United States acquired Enewetak Atoll from the Trust Territory of the Pacific Islands in 1947 to use as a nuclear weapons proving ground. Before the testing began, the United States relocated the people of Enewetak, then numbering 142, to Ujelang Atoll, a smaller less desirable atoll where they still reside. Forty-three nuclear tests were held at Enewetak from 1948 to 1958 leaving contaminated soil and scrap.

The people of Enewetak, displaced now for more than 30 years because of nuclear contamination on their island, suffered the physical hardship of living on a much smaller atoll with increasing numbers of people and the psychological hardship of being removed from their traditional land.

Land is important to the people of the Marshall Islands because it is the only source of subsistence, social status, and family unity. When asked at a congressional hearing why a monetary settlement instead of returning to Enewetak was not acceptable, Enewetak representatives replied that money was not and never could be a substitute for their islands. (See pp. 1 and 2.)

In 1972, the United States announced it was prepared to release Enewetak Atoll to the Trust Territory assuming it would eventually be cleaned up and resettled. This project is underway and is expected to be completed in 1980 at a cost of about \$100 million to \$105 million. (See pp. 2 and 3.)

With the project now about 60-percent completed, the Defense Nuclear Agency is projecting that all major cleanup objectives will be met or exceeded.

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If the United States accomplishes all its objectives for cleaning up the Atoll, the Enewetak people might not either knowingly or unintentionally violate U.S.-recommended living pattern restrictions to avoid over-exposure to radiation. As the time for resettlement approaches, the people are less willing to defer, perhaps for as long as 100 years, establishing residences on Enewetak's second largest island, Enjebi, until certain radioactive elements no longer pose a radiation hazard. GAO also questions whether it is realistic to assume that the people of Enewetak will honor forever the permanent quarantine of the highly radiologically contaminated island of Runit, Enewetak's fifth largest island.

Unsettled test-related issues remain which could result in difficulties for the United States if not resolved soon. These issues include, but are not necessarily limited to, loss of land, loss of land use, loss of cash crops, radiological monitoring, and the possibility that recommended living pattern restrictions will not be observed. (See p. 13.)

Significant radiological aspects of the project have not been independently assessed. Independent assessments are, in GAO's opinion, necessitated by the importance of the project to the people of Enewetak and the United States. (See p. 18.)

The Enewetak project was preceded by a similar project at Bikini Atoll. Attention was recently focused on Bikini when excessive quantities of radioactive elements were detected in some of the people living there. This discovery triggered a decision by the Department of the Interior to again relocate the people of Bikini. (See p. 4.)

#### RECOMMENDATIONS

The Office of Micronesian Status Negotiations should make every attempt to arrive at an agreement with the Marshall Islands Political Status Commission and the people of Enewetak concerning the nuclear test-related issues still unresolved, such as:

- Lost land or land use as a result of nuclear tests.
- Lost cash crops found to be unacceptably contaminated with radioactive elements.
- Specifying what the responsibility of the United States would be should the people of Enewetak choose not to observe recommended living pattern restrictions.
- The course(s) of action to be taken should the people of Enewetak receive excessive doses of radiation.
- The specifics of followup radiological surveys and of monitoring the health of the resettled people and the radioactivity in the environment.
- The future status of the entombed radioactivity-contaminated soil and debris on Runit and how future monitoring and inspection will be accomplished.
- The specifics of a supplemental feeding program, if required, until the people of Enewetak are agriculturally self-sufficient.

The Secretary of the Interior should initiate an independent technical assessment of the Enewetak cleanup project.

#### AGENCY COMMENTS

Written comments were received from the Departments of the Interior, Energy, and State (see apps. I to III.) In addition, the report was discussed informally with the Director of the Defense Nuclear Agency and representatives of the Office of Micronesian Status Negotiations.

The Secretary of the Interior said the future problems GAO mentioned are being considered by the Departments of Energy and the Interior and the Micronesian Status Negotiators. The Department of State replied that the issue of post-trusteeship liability and claims resulting from the nuclear testing program has been raised in the Micronesian Status Negotiations. (See app. III.)

This report was discussed with representatives of the Office of Micronesian Status Negotiations, an interagency office tasked with the negotiation of the future political status of the Trust Territory of the Pacific Islands. They stated that the issues concerning liabilities and claims resulting from the U.S. nuclear testing program have been raised in the negotiations.

The Department of Energy stated it would welcome an independent radiological assessment of the Enewetak cleanup project. However, the Department of the Interior and the Defense Nuclear Agency feel that an independent assessment is not necessary. (See apps. I and II.)

The Departments of the Interior, State, Energy, and Defense provided other, more detailed comments that GAO included in the body of the report where appropriate.

#### LIMITATIONS ON REPORT DISTRIBUTION

This is a restricted report with limited distribution since negotiations between the United States and the Marshall Islands Political Status Commission concerning the ending of the trusteeship agreement are currently in progress. The issues of posttrusteeship liability and claims are part of the Status Negotiations. It is believed that release of this report while negotiations are in progress would not be in the best interest of the Government.

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## ABBREVIATIONS

AEC	Atomic Energy Commission
DNA	Defense Nuclear Agency
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
GAO	General Accounting Office
TTPI	Trust Territory of the Pacific Islands



## CHAPTER 1

### INTRODUCTION

#### THE SITUATION

Enewetak Atoll, located in the northwestern portion of the Marshall Islands, is part of the Trust Territory of the Pacific Islands (TTPI). The United States acquired the atoll from the TTPI in 1947 to use as a nuclear weapons proving ground. In late 1947, before the testing program started, the United States resettled the people of Enewetak, then numbering 142, on Ujelang Atoll, a considerably smaller atoll about 124 miles southwest, where they still reside. Forty-three nuclear weapons tests were held at Enewetak Atoll from 1948 to 1958. The tests contaminated some of the islands of the atoll with radioactive elements and littered the other islands with uncontaminated debris.

#### THE PLIGHT OF THE PEOPLE OF ENEWETAK

The people of Enewetak, displaced now for more than 30 years, have suffered both the physical hardships of living with a growing population <sup>1/</sup> on a much smaller atoll than their home atoll and the psychological hardships of being removed from their traditional land. This latter hardship is the greater burden, as the land is all important to the Marshallese people--not only for subsistence, but also for social status and family unity. A comparison of Enewetak and Ujelang Atolls in square miles of area follows:

	<u>Lagoon</u>	<u>Dry land</u>
Ujelang Atoll	25.47	0.67
Enewetak Atoll	337.99	2.75

The limited food production potential on Ujelang has made it necessary to import more commodities than would normally be required on Enewetak.

During the 1978 Department of the Interior (DOI) appropriations hearings, representatives of the people of Enewetak said that the desire of the people to return to their original residence has never diminished, but rather, has

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<sup>1/</sup>About 450 people are expected to resettle on Enewetak Atoll.

increased with time. They said that for them to live anywhere else in the world would make them squatters and vagabonds; the land, the atoll, is part of them and they are part of it, in a way which is difficult to describe. They said every family and every person, including newborn infants, has a specific place there, inherited from their ancestors.

When asked why they do not just accept a monetary settlement instead of returning to Enewetak, they replied that money is not and never can be a substitute for their islands. They said it is against their nature and their custom to sell their land or to take money for it. They concluded that from their point of view, they must return to Enewetak Atoll because it is the only place which God has set aside for them and for no other people.

The Senate Committee on Armed Services agreed to a one-time authorization of \$20 million to accomplish the cleanup. Although the moral obligation to permit the people of Enewetak to return to their atoll was a major consideration, the Committee based its decision primarily on the premise that the United States cannot walk away from the damage done by its testing program without making a responsible effort to restore the atoll so it can again be habitable.

#### PROJECT RESPONSIBILITIES

The United States in 1972 announced it was prepared to release Enewetak Atoll to the TTPI assuming the major radioactive contaminants would eventually be cleaned up and the island resettled. Mobilization of the project began in May 1977 and is expected to be completed in April 1980.

The Enewetak project involves three phases--cleanup, rehabilitation, and resettlement. <sup>1/</sup> The first phase, cleanup, managed by the Department of Defense's (DOD's) Defense Nuclear Agency (DNA), consists of debris, structures, and soil removal posing radiation or other human habitation hazards. The Energy Research and Development Administration

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<sup>1/</sup> Long-range development has been recognized as a fourth and continuing phase, but is not considered part of the current project.

(ERDA), now part of the Department of Energy (DOE), was assigned responsibility for providing technical data and advise on all radiological matters. It also assumed responsibility, including funding for followup radiological surveys, monitoring the health of the resettled people, and monitoring the radioactivity in the environment after rehabilitation. DOI, which administers the TTPI under a trusteeship agreement with the Security Council of the United Nations, is responsible for the rehabilitation and resettlement of Enewetak Atoll and for the enforcement of advisory controls.

#### PROJECT FUNDING

Congress has appropriated about \$32.4 million specifically for the Enewetak Atoll cleanup, rehabilitation, and resettlement program:

<u>Department</u>	<u>Purpose</u>	<u>Amount</u> (millions)
Defense	Cleanup	\$20.0
Interior	Rehabilitation	<u>12.4</u>
Total		<u>\$32.4</u>

The Military Construction Appropriation Act of 1977 stipulated that DOD's \$20 million could not be spent until the Enewetak people agreed that it constituted the total United States cleanup commitment. The people of Enewetak agreed to this on September 16, 1976. The act enjoined DOD to achieve every possible economy through maximum use of its resources. In this regard, it directed that military forces and support activities funded for normal operations should be used on the project without reimbursement from military construction funds.

The Director, DNA, recently estimated that the cost of cleaning up, rehabilitating, and resettling Enewetak Atoll could amount to about \$100 million to \$105 million. This estimate includes the cost of military forces and support activities, DOI's rehabilitation costs, and DOE's technical assistance costs.

#### COMPARISON OF THE ENEWETAK AND BIKINI PROJECTS

The Enewetak Atoll cleanup, rehabilitation, and resettlement program was preceded by a similar project at Bikini Atoll. In December 1966, the Atomic Energy Commission (AEC) (now part of DOE) at the request of DOI, agreed to determine if Bikini Atoll and its lagoon were safe for habitation. In April and May 1967, AEC made an extensive radiological survey of the atoll. A year was required to analyze the radiation data and environmental samples collected during the survey, data from all previous surveys, and TTPI reports concerning the living habits and diets of the people of Bikini. After reviewing all available data, an ad hoc committee of eight consultants appointed by AEC concluded that radiation offered no significant threat to the health and safety of any of the people of Bikini who might elect repatriation. The committee also recommended actions that would further reduce exposure to radiation--for example, dietary supplements, periodic surveys of the atoll, and radioactive scrap removal.

Based on the favorable findings of the ad hoc committee and the expressed desires of the people of Bikini, the Secretary of the Interior recommended to the President that the United States take action as necessary to return the people of Bikini to their home atoll. In 1968 the President announced that the people of Bikini would be returned to their former home. Cleanup and rehabilitation work began in February 1969. DOD and AEC were responsible for the cleanup and the radiological health and safety aspects of the cleanup, and DOI was responsible for rehabilitation and resettlement. The cleanup was completed in October 1969. The AEC certified that the program of radiological scrap removal, environmental sampling, and general radioactive cleanup had been satisfactorily completed.

The Bikini project was the focus of recent publicity and congressional concern when excessive quantities of radioactive elements were detected in some of the people living there. These discoveries triggered a DOI decision to again relocate the people living on the island of Bikini. Bikini Atoll may not be habitable again for at least 30 years.

Although similar in nature, there are significant differences in the Enewetak and Bikini projects. For example, some radioactive contaminated Enewetak soil is being excavated and disposed of, whereas there was no cleanup of such contaminated soil at Bikini. Moreover, residences for the people of Enewetak, unlike those for the people of Bikini,

are being constructed on islands which are essentially free of radioactive contamination. The following is a partial comparison made by DNA of the Bikini and Enewetak cleanup projects.

--Similarities: both atolls are located in the Western Pacific near the international date line just north of the equator. The diet and living habits of both people are about the same--they tend to live in family groups on the largest islands, grow subsistence crops near the family living area, and develop larger areas for cash crops. Birds, bird's eggs, and other edible wildlife are gathered from the smaller islands. Fish are taken from the lagoon and clams and other shell fish are gathered from the reef. They are primarily gatherers rather than producers. An extensive survey was conducted in both cases to determine the impact of testing on the environment. This was followed by an extensive report of the findings and an evaluation of the physical and radiological hazards. On both atolls, the radio-nuclides of principal concern are cesium-137, strontium-90, and plutonium. The likelihood of an individual receiving a dangerous dose of radiation from external radiation on either atoll is extremely small because of the low average of surface radioactivity levels. The lagoon water has very low radioactivity levels, and the fish and shell fish were found to have low levels of radioactivity. However, the foods which are grown in the soil containing cesium and strontium were found to have high levels of radioactivity and were predicted to be the principal sources of exposure. In some cases the ground water contains cesium and strontium.

--Differences: the differences are significant. At Enewetak there were 43 tests, one of which was a safety test which produced no nuclear yield but a large amount of contamination, compared to only 23 detonations on Bikini. Most of the tests at Bikini were over water, placing the craters and most of the debris in the lagoon. At Enewetak the majority of tests were conducted on or over land. All but two of the tests were in the northern

islands where all the significant radiological contamination is found. During testing, Enewetak had well-established base camps to support scientific and other test personnel in the southern half of the atoll which is relatively free of contamination, whereas all of the islands on Bikini Atoll were contaminated, some more than others, by fallout.

#### SCOPE OF REVIEW

We reviewed the Enewetak Atoll cleanup, rehabilitation, and resettlement project to identify significant issues which should be resolved before the United States considers the project finished. We interviewed officials of agencies involved in the project and representatives of the people of Enewetak. We also reviewed pertinent files, reports, and other materials and observed conditions on the atoll.

The review was principally performed at:

- DNA Headquarters, Alexandria, Va.
- DOE Headquarters, Germantown, Md.
- DOI Headquarters, Washington, D.C.
- Field Command, DNA, Albuquerque, N. Mex.
- Nevada Operations Office, DOE, Las Vegas, Nev.
- Office of the High Commissioner, TPTI, Saipan, Mariana Islands.
- Enewetak Atoll.

## CHAPTER 2

### STATUS OF RADIOLOGICAL CLEANUP EFFORTS

As work progressed on the radiological debris and soil cleanup phase at Enewetak, DNA was unsure whether the original cleanup plan could be achieved. If not, more living pattern restrictions than initially envisioned would have had to be imposed on the people returning to Enewetak. These concerns did not materialize and DNA anticipates that the original cleanup objectives will be completed on schedule and within cost projections. Even though all the cleanup objectives are being met, the people of Enewetak must still cooperate in following the recommended living pattern restrictions to avoid overexposure to radiation.

#### THE ENEWETAK CLEANUP AND HABITATION PLAN

DNA and DOE agreed that the cleanup of Enewetak Atoll would include removal and disposal of the radiological hazard so that the people could be resettled safely. They acknowledged that it was impossible to reduce radiological contamination to pretest levels. They agreed, however, that it was feasible to rehabilitate the atoll to assure the safety of the returning people if certain restrictions on land use and locally grown foods were followed and the residual radioactivity was continually surveyed.

The Enewetak Atoll Master Plan divides the islands of the atoll into three categories reflecting the primary use of each island. The plan designates the islands as inhabited, agricultural, or food-gathering sites, as decided by the Enewetak people.

When the Enewetak people learned that Enjebi Island could not be used as a residential site due to residual radioactivity, they agreed that the Enewetak, Medren, and Japtan Islands would be their residential sites. Agricultural development will complement the permanent community development on these islands.

Both subsistence and cash crops will be grown on the major inhabited islands. Agricultural islands will be devoted almost entirely to cash crops. The map on page 9 shows the planned use of the atoll by island.

The Enewetak Atoll Environmental Impact Statement (EIS) listed the following cleanup actions to be taken on Enewetak Atoll.

- Remove physical hazards from all islands.
- Remove obstructions to development of habitation and agriculture.
- Remove radioactive scrap from all islands of the atoll.
- Remove plutonium concentrations greater than 400 picocuries per gram from Boken, Lujor, and Runit. Concentrations of less than 40 picocuries per gram were not to be disturbed. Concentrations between 400 and 40 picocuries per gram were to be dealt with on an individual basis. 1/
- Remove plutonium from the three burial crypts on Aomon.
- Dump unsalvageable nonradioactive and noncombustible material in the lagoon at selected locations to form artificial reefs.
- Mix plutonium-contaminated soil with cement and water to form a slurry 2/ and place it in a crater on Runit. Also dump radioactive debris into the crater.

The habitation plan provides that the people of Eniwetok live and obtain food as follows:

- Residence restricted to the southern islands; Jinedrol through Kidrenen.
- Runit quarantined indefinitely; no other restrictions on travel.
- Cultivate pandanus, breadfruit, arrowroot, and other subsistence food on the southern islands only.

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1 The cleanup criteria has since been refined to 40 picocuries per gram for residential islands, 80 picocuries per gram for agricultural islands, and 160 picocuries per gram for food-gathering islands.

2 A watery mixture of insoluble matter.



This map shows the Line Islands area, including islands such as Bikini, Eniwetok, and others. It includes a legend with symbols for Living & Agricultural Islands, Agricultural Islands, Food Gathering & Pacific Islands, and Uninhabited. The map also features a scale bar and a compass rose.

--Coconuts could be grown only on the southern islands and the northern islands of Mijikadrek through Billae. 1/ The northwest islands of Bokoluo through Enjebi and Runit were not to be cultivated.

--Raise livestock to be used for food on the southern islands only.

--Eat coconut crabs taken from the southern islands only.

--Eat fish from the lagoon and wild birds and their eggs without restrictions (except for Runit).

#### CLEANUP PROGRESS

At the time of our visit to Enewetak in May of 1978, DNA was not sure to what degree the original cleanup plan, as outlined in the Enewetak Atoll EIS and later revised by the Enewetak Advisory Group, could be accomplished. With the project now about 60-percent completed, DNA is projecting that all major cleanup objectives will be met or exceeded. For example, the island of Enjebi which was planned to be cleaned of transuranics 2/ to the level of 80 picocuries per gram, has been cleaned to below 40 picocuries per gram. Only the island of Runit in the 40-island atoll will be quarantined. DNA anticipates that all cleanup efforts can be completed on schedule and within the planned funding level.

#### LIVING PATTERN RESTRICTIONS

The Enewetak Atoll EIS contained a habitation plan listing certain living restrictions for the people returning to the atoll. Because it is impossible to reduce radiological contamination on all the islands to pretest levels, living pattern restrictions will have to be imposed on the returning Enewetak people. Even though DNA is accomplishing all the cleanup objectives of the Enewetak Atoll Master Plan, the

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1/DOE has since recommended that coconuts not be grown on the northeast islands because of experience gained from Bikini.

2/Transuranic elements are those having atomic numbers greater than that of uranium.

people could still be overexposed to radiation by knowingly or unintentionally failing to follow recommended living pattern restrictions. How long these living pattern restrictions will be necessary is not known. Therefore, the peoples' cooperation is needed if the resettlement effort is to be successful. DOE plans a long-term radiological followup of the people and their environment to determine if radiation doses are staying within acceptable limits.

#### CONCLUSIONS

As work progressed on the Enewetak cleanup, it appeared that a modified solution to the radiological contamination problem on the atoll would be necessary. However, this has not proven to be the case. According to DNA, the cleanup will produce better results than originally planned. The people of Enewetak, however, will still have to abide by certain U.S.-recommended living pattern restrictions to minimize their chances of receiving excessive radiation doses.

### CHAPTER 3

#### NEED TO RESOLVE TEST-RELATED ISSUES

Some test-related issues remain unsettled and need to be resolved soon. The issues include, but are not necessarily limited to, loss of land, loss of land use, loss of cash crop, radiological monitoring, the need for a supplemental feeding program, the observance of living pattern restrictions, and the actions to be taken should the people of Enewetak receive excessive doses of radiation. The expectation that the TTPI Agreement will end by 1981, plus the fact that the future political status of the Marshall Islands, of which Enewetak Atoll is a part, is uncertain, further complicates matters. Some of these issues are presently being addressed by the Office of Micronesian Status Negotiations.

The Enewetak people have been paid various sums by the United States for use of the atoll and for war damage. These payments, however, have not included amounts for damage related to the nuclear testing program.

#### COMPENSATION AWARDED AND PAID TO THE PEOPLE OF ENEWETAK

In 1956, 9 years after the people of Enewetak were relocated by the United States to Ujelang Atoll, the TTPI paid the people \$25,000 in cash and \$150,000 in trust for use of the atoll. In 1969, TTPI paid them another \$1,020,000 in trust for (1) the hardships they suffered as a result of being displaced, (2) their continued displacement in the foreseeable future, and (3) the decline in productivity of subsistence agriculture. In 1976, TTPI permanently transferred title of Ujelang Atoll to the people of Enewetak as additional consideration.

Also in 1976, the Micronesian Claims Commission awarded the people of Enewetak about \$3 million, pursuant to titles I and II of the Micronesian Claims Act of 1971. <sup>1/</sup> The Commission's decision specifically provided that none of the award was for lost use of land or damage occurring after 1951 and directly related to the atomic testing program. The people of Enewetak were paid about \$1.7 million because the

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<sup>1/</sup>Title I deals with World War II claims and Title II deals with post-World War II claims before July 1, 1951.

awards considerably exceeded the amount of funds then available under the Micronesian Claims Act. In 1977 the Congress authorized the appropriation of such additional sums as might be necessary to satisfy all adjudicated claims and final awards under the act. In October 1978, the Congress appropriated \$12.6 million to pay the outstanding balances of the Title II awards, including about \$1.5 million due the people of Enewetak.

### POTENTIAL ISSUES

#### Loss of land

DNA estimated that about 154 acres, or about 8 percent of Enewetak Atoll's acreage, was lost as a result of nuclear weapons testing. The tests reportedly vaporized five islands and a large portion of another. Representatives of the people of Enewetak told us in May 1978 that the United States should compensate for the lost land.

At least one island (Runit) contaminated with radioactive elements from the nuclear tests is expected to be quarantined indefinitely. Others may be unfit for the use desired by the people of Enewetak. Any issues concerning loss of use, or loss of intended use, of some of the islands should be addressed and settled before termination of the TTPI Agreement.

#### Loss of copra "cash crop"

Copra (dried coconut meat) is the traditional "cash crop" of the Marshallese. Coconut trees to be planted on Enewetak Atoll during the rehabilitation program will take 5 to 7 years to begin producing nuts. The Enewetak Atoll Master Plan of March 1975 estimates that copra could bring the people of Enewetak about \$100,000 a year at then-current prices.

The planting of coconut trees on Enewetak's northeastern islands has been delayed because of the Bikini experience. As early as 1974, Environmental Protection Agency (EPA) expressed concern about planting coconuts on the northeastern islands. Its position was that coconut production on those islands should be deferred unless there is no practicable alternative to providing an adequate diet, or radionuclide contamination is actually much lower than predicted.

Should the cash crop copra be contaminated with radioactive elements in excess of acceptable limits or the planting of coconuts delayed, the people of Enewetak and the United States should agree on how such an event is to be handled. Matters to be resolved are

- the particulars of testing cash crop coconuts for radioactive elements uptake;
- the method of disposal if the copra is found to be unacceptably contaminated with radioactive elements; and
- the amount of compensation, if any, for such loss.

Need for a provision specifying the United States' responsibility if the people of Enewetak choose not to observe recommended living pattern restrictions

Several restrictions regarding living patterns, the growing of foodstuffs, food gathering, etc., were proposed to and accepted by the people of Enewetak. In returning the people to their home atoll, it is assumed that such restrictions will be observed. Although DOI, through TTPI, is responsible for enforcing such advisory controls, this arrangement is temporary since the TTPI Agreement will soon end. If restrictions are not observed, the people of Enewetak could receive excessive doses of radioactive elements as did some of the people who returned to Bikini Island. As the time for resettlement approaches, the people of Enewetak are less willing to defer (for perhaps as long as 100 years) establishing residences on Enewetak's second largest island, Enjebi, until certain radioactive elements no longer pose a radiation hazard as originally agreed.

The United States does not plan to clean up all the islands of Enewetak Atoll to the point where no restrictions would have to be imposed. Therefore, it is imperative that a provision be made specifying the United States' responsibility should the people of Enewetak choose not to observe recommended living pattern restrictions.

Need for agreement on action to be taken should the people of Enewetak receive excessive doses of radiation

Because of the uncertainty of the long-term effects of exposure to low-level radiation, it is possible that the

people of Enewetak could receive radiation doses in excess of current standards even if they adhere to living pattern restrictions. Further, even if the people of Enewetak do not receive excessive radiation doses by current standards, their doses could eventually be considered excessive should radiation dose standards become more stringent. According to EPA sources, there is a good possibility that will happen.

We believe representatives of the people of Enewetak and the United States should agree, in advance, on what course(s) of action will be taken should either of these possibilities become a reality.

Need for agreement on followup  
radiological surveys and monitoring

DOE assumed responsibility, including funding, for future periodic followup radiological surveys of Enewetak Atoll and for periodic monitoring of the health status of the resettled people. It also is responsible for monitoring the radioactivity in the environment after rehabilitation. These matters are vitally important, because only through followup monitoring can potentially harmful radiological situations be detected before becoming an actual hazard. The United States, however, has no official agreement with the people of Enewetak regarding these matters. Such an agreement could avert potential future conflict regarding surveys and monitoring and would assure that any developing hazardous radiological problem would be detected early and dealt with quickly.

Need for agreement to monitor  
and inspect entombed radioactive  
soil and debris

The radioactive soil excised from Enewetak Atoll for disposal will be entombed on the atoll in a crater on Runit Island. The island will be quarantined indefinitely. The soil, mixed with cement and water to form a soil-cement slurry, will be placed in the crater. Radioactive debris will also be dumped into the crater. An 18-inch thick concrete cap will be placed over the entire mass for erosion resistance and as a shield from alpha radiation. Migration of some plutonium particles to the surrounding environment could occur since this method of entombing, or containing, the contaminated material is not leak-proof. Any such migration is not expected to pose a hazard. This method of containment will require periodic monitoring and inspection to ensure its integrity. DOE is responsible for monitoring any effluent

1 Waste material discharged into the environment.

from the disposal of radioactive debris and soil on Runit Island. They stated, however, that this does not include monitoring or inspecting the engineering features of the entombed debris.

With the termination of the TTPI Agreement, the United States will be leaving a radiological contamination legacy on foreign soil. However, there has been no agreement between the peoples of Enewetak and the United States on the future status of the entombed radioactive soil and debris or how to accomplish future monitoring and inspection.

#### Supplemental feeding program

Until the agricultural system provides enough food for the people of Enewetak when they return to their home atoll, the United States may need to initiate a supplemental feeding program to fill the void. The possible extent of the feeding program at this time is uncertain; however, the particulars of the program, including the criteria for starting and ending it, could be resolved.

#### CONCLUSIONS AND RECOMMENDATION

In the wake of the Bikini situation and the uncertain effect of low level radiation on humans, the United States can hardly afford to leave several significant issues related to the Enewetak cleanup program unresolved, since the TTPI Agreement is being terminated. These issues include:

- Lost land or land use as a result of nuclear tests.
- Lost cash crops found to be unacceptably contaminated with radioactive elements.
- Specifying what the responsibility of the United States would be should the people of Enewetak choose not to observe recommended living pattern restrictions.
- The course(s) of action to be taken should the people of Enewetak receive excessive doses of radiation.
- The specifics of followup radiological surveys and of monitoring the health of the resettled people and the radioactivity in the environment.



- The future status of the entombed radioactivity-contaminated soil and debris on Runit and how future monitoring and inspection will be accomplished.
- The specifics of a supplemental feeding program, if required, until the people of Enewetak are agriculturally self-sufficient.

The Office of Micronesian Status Negotiations and the agencies principally concerned are considering these and other issues that could arise from the United States' past nuclear testing program and related activities in the Marshall Islands.

We recommend that the Office of Micronesian Status Negotiations make every attempt to arrive at an agreement with the Marshall Islands Political Status Commission and the people of Enewetak concerning all of these issues.

#### AGENCY COMMENTS

DOI stated that the future problems we mentioned are generally being considered by DOE, DOI, and the Micronesian Status Negotiators. The State Department replied that the issue of posttrusteeship liability and claims resulting from the U.S. nuclear testing program has been raised in the Micronesian Status Negotiations. They stated that detailed provisions have not yet been discussed and it is impossible at this time to determine what degree of detail the U.S.-Micronesian Compact of Free Association will contain.

## CHAPTER 4

### ENHANCING PROJECT CREDIBILITY

#### THROUGH INDEPENDENT ASSESSMENTS

Significant radiological aspects of the cleanup portion of the Enewetak Atoll project have not been independently assessed by organizations with no connection or interest in the nuclear testing program. This situation could conceivably raise questions on the objectivity of the project. Independent assessments are, in our opinion, unequivocally dictated by the importance of the project to the peoples of Enewetak and the United States. Supporting this is the recent Bikini incident; the uncertain, long-term effects of exposure to low level radiation; and finally the project cost, which is estimated at about \$100 million.

#### CLEANUP CRITERIA

EPA is responsible for establishing guidance on radiation dose limits for persons exposed to radioactive elements in the general environment. In 1974 it accepted, in general, the radiological cleanup criteria for Enewetak Atoll with the stipulation that the criteria should be considered as upper limits and that the cleanup levels and population doses should be kept as low as practicable.

In September 1977 EPA published proposed guidance on dose limits for persons exposed to transuranic elements. DOE's advisory group on the cleanup criteria believes the Enewetak cleanup criteria will result in average transuranic radiation doses to the returning people commensurate with the proposed EPA guidelines. But, it stated that it could not assure that the radiation doses would not significantly exceed the proposed EPA guidelines. It pointed out the uncertainties inherent in the present understanding of radiation problems. Further, it advised DOE that many of the factors involved in movement of transuranics in the environment and the disposition and retention of transuranics in human beings are not well established.

#### POSTCLEANUP HAZARDS

DOE is responsible for providing radiological cleanup criteria for Enewetak Atoll and for assessing the post-cleanup suitability of the atoll for habitation.

EPA has analyzed the potential hazards to individuals in the general population resulting from present levels of transuranic elements existing in the environs 1/ of at least one other location. It examined the various pathways into the human body that radiation might take if exposure occurred under present and projected land usages interpreted in light of its proposed guidelines for exposure to transuranic elements. EPA, however, has not been designated to technically assess the Enewetak Atoll cleanup.

A radiochemistry field laboratory under the direction of DOE has been established on Enewetak Atoll to support the radiological protection program and the plutonium soil analysis operations. Representative soil samples are analyzed by the laboratory for americium and plutonium concentration data. Documentation of soil concentrations is essential to DOE's final certification of the radiological condition of each island. There was no quality control program by an independent laboratory verifying soil samples.

#### CONCLUSIONS AND RECOMMENDATION

Because of the importance of the radiological cleanup of Enewetak Atoll to the people of Enewetak and the United States, the recent Bikini situation, and the recognized uncertainties surrounding radiation levels that constitute a hazard, we recommend that the Secretary of the Interior initiate an independent technical assessment of the Enewetak cleanup project. DOI should initiate this action, since it has the ultimate responsibility for rehabilitation and resettlement of the Enewetak people and must handle any problems that may develop during the intervening time before the TTPI Agreement ends. This is evident by the recent Bikini incident where DOI was responsible for the funding and action plan to again resettle the people.

#### AGENCY COMMENTS

The Department of Energy stated it would welcome an independent assessment of the radiological support that has been provided to DNA and DOI in their cleanup and rehabilitation activities at Enewetak Atoll and of its plans to provide needed followup in the future. They offered their full cooperation in this matter.

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1 The surrounding area.

DNA and DOI, however, feel that an independent assessment is not necessary. DOI states that to do so would mean contracting with essentially the same research institutions currently being used by DOE. DNA states that both DCE and DOD have made, and are making, continual radiological assessments using a wide variety of experts, including numerous independent ones. (See apps. I to III.)

We found, however, that the radiological assessments are being made by employees of DOE and DOD or contractors working for these agencies. While we do not question the expertise or credibility of these experts, we believe that this situation could conceivably raise questions on the objectivity of the project. We believe that other experts who have no direct connections with the nuclear testing program or the Enewetak cleanup project should perform an independent assessment of the cleanup criteria and the post-cleanup hazards and report to DOI before resettlement of the people begins. This independent assessment could be made by reviewing DOE's radiological support data for the project.

APPENDIX I

APPENDIX I



## United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

JAN 5 1979

Mr. J. H. Stolarow, Director  
Procurement and System Acquisition Division  
U. S. General Accounting Office, Room 6915  
441 G Street, NW  
Washington, D. C. 20543

Dear Mr. Stolarow:

The draft GAO Report, "Observations on the Project to Cleanup, Rehabilitate and Resettle Enewetak Atoll" was reviewed with interest by appropriate offices of this Department. While the report addresses itself primarily to the cleanup program which is being carried out by the Department of Defense (DNA), it is recognized that the rehabilitation and resettlement aspects cannot be divorced from the basic cleanup aspects.

Our comments have been divided into two sections, one which deals with the recommendations that relate to the rehabilitation aspects, the other lists corrections for the text of the report.

I hope that these comments will prove to be useful for the preparation of the final report.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Larry E. Brown", written over the typed name.

LARRY E. BROWN  
Deputy Assistant Secretary  
Policy, Budget & Administration

Enclosures

(See GAO note 2 on p. 24.)

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COMMENTS ON RECOMMENDATIONS ADDRESSED TO  
THE SECRETARY OF THE INTERIOR

Is a modified solution to the problems acceptable to the people of Enewetak as well as the United States

It should be noted that all phases of the Enewetak program have been discussed with the people of Enewetak. An Enewetak Planning Council was formed by the people for this purpose. This Council, along with the Legal Counsel for the people of Enewetak, meets regularly with representatives of DOD, DOE, and the TTPI and DOI. The Planning Council has been involved in all aspects of the cleanup, rehabilitation and resettlement planning and the implementation aspects. Major decisions are made only after the Enewetak Planning Council is in agreement. For example, when it was found that the northern island of Enjebi should not be used for residential purposes immediately, it was the "Enewetak Planning Council" that made the decision that all of the residences would be built on the three uncontaminated southern islands of Enewetak, Medren and Japtan. The latest Inter-Agency meeting in which the Enewetak Planning Council took a leading role was held on Enewetak the week of December 4, 1978.

Agreements should be reached between the people of Enewetak and the United States concerning:

- Compensation for lost land or land usage as a result of the nuclear tests

A Task Force established by the Office of Micronesian Status Negotiations is examining this issue and until a final report is available, comment is withheld.

- Compensation for loss of their cash crops if the crops are found to be unacceptably contaminated with radioactive elements

This aspect is not yet determined. The Department of Energy has agricultural experiments underway. Decisions on this aspect must be held in abeyance until results of these experiments are known. The Department of the Interior accepts the premise that there should be compensation if crops cannot be used.

- Obtaining formal unqualified assurance that the living pattern restrictions will be effectively enforced after the Trust Agreement is ended

To date, the Enewetak Planning Council and the Enewetak Planning Council have pledged that the people will follow.

the restrictions recommended by the Department of Energy. Similar pledges could be obtained when all of the cleanup and rehabilitation work is completed. The Department of the Interior feels constrained to point out the impossibility of demanding "formal unqualified assurances" short of the United States Government or the new emerging Marshalllese Government keeping a permanent security force on the atoll to enforce restrictions. Reliance must be placed upon the representatives of the people themselves.

- the specifics of follow-up radiological surveys, of monitoring the health of the resettled people and the radioactivity in the environment, and of periodically monitoring and inspecting the entombed radioactively contaminated soil and debris on the island of Runit

These specific aspects are the responsibility of the Department of Energy. Long range plans call for this type of monitoring to be carried out by the DOE.

- the future status of the entombed radioactively contaminated soil and debris and how future monitoring and inspections can be accomplished

This aspect is the responsibility of the Department of Energy and the Department of the Interior yields to that Department for comment.

- the specifics of a supplemental feeding program, if required, until the time the people of Enewetak are agriculturally self-sufficient

The Trust Territory Government and the Department of the Interior are exploring this aspect with the people of Enewetak and their legal counsel. The Department of the Interior, on behalf of the Government of the Trust Territory, will attempt to work out satisfactory arrangements for a supplemental feeding program should this prove to be necessary.

The Secretary of the Interior should have an appropriate independent organization assess:

- the radiological cleanup criteria used by Defense to meet project goals, and
- the post-cleanup radiation hazards.

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The Secretary of the Interior should also initiate independent laboratory quality control checks of the soil samples which are essential to the final certification of the radiological condition of each island.

The Department of the Interior notes that to carry out an independent assessment, as recommended by the draft GAO report, the Secretary would have to contract with essentially the same research institutions in the United States as are currently being used by the Department of Energy. The Secretary has no information to lead him to believe that the analyses prepared by the research institutions now working on the Eniwetok radiological material are unacceptable. He further notes that the Department of Energy has established an advisory committee, composed of leading scientists in the radiation field, which reviews the research analyses and recommendations. The Department is informed that the Department of Energy gives great weight to the views of this advisory committee. Accordingly, at this time, it is the view of the Department of the Interior, that adequate radiological assessment is being carried out on the Eniwetok cleanup program.

- GAO note:
1. Some of the agency comments relate to matters in the draft report which have been revised as suggested by the agency or omitted from the final report.
  2. The enclosure is not included here. Where appropriate, the report has been changed to reflect comments in the enclosure.





Department of Energy  
Washington, D.C. 20545

December 28, 1978

Mr. J. Dexter Peach  
Director  
Energy and Materials Division  
General Accounting Office  
Washington, D.C. 20548

Dear Mr. Peach:

We appreciate the opportunity to review and comment on the GAO draft report entitled "Observations On The Project To Cleanup, Rehabilitate And Resettle Enewetak Atoll." Our views with respect to the draft report and the recommendations contained therein follow:

1. The draft report notes in several places that the potential exists for future legal difficulties because of loss of land, loss of land usage, loss of cash crops, and the absence of long-term agreements with the people of Enewetak. In Chapter 3 the report vaguely indicates that the legal difficulties would be in the nature of claims against the United States. However, the report does not elaborate on this point. There is no indication under what authority such claims could be made.

Under the Federal Tort Claims Act, any claims arising out of a discretionary function of the Government (28 USCA 2680 (a)) or "in a foreign country" (28 USCA 2680(k)) are specifically excluded from coverage by the Act. Of course, the most obvious of these as far as claims from the people of Enewetak goes would be the foreign country exclusion. The courts have held that the phrase "in a foreign country" in Sec. 2680(k) is used with the meaning dictated by common sense and common speech. Places that have been held by the courts to constitute a "foreign country" within the contemplation of the exclusion include the Pacific Islands of Okinawa, Saipan, and Kwajalein. It is, therefore, reasonable to assume that Enewetak would almost surely come within the exclusion.

The legislative history of the Federal Tort Claims Act discloses that Congress excluded claims arising "in a foreign country" because liability under the Act was to be determined "in accordance with the law of the place where the act or omission occurred" and Congress "was unwilling to subject the United States to liabilities depending upon the laws of a foreign power." Indeed, Congress has expressed

the clear intention that claims for property damage, personal injury, or death arising out of activities of U.S. military and civilian personnel abroad are to be dealt with by administrative or diplomatic means, or by special legislation, as may be appropriate, rather than by litigation under the Federal Tort Claims Act.

One area that could possibly provide limited relief in a foreign situation would be the Military Claims Act. However, limited claims from foreign claimants are allowed only if presented within two years after each claim accrues. See 10 USCA 2731 et seq.

DOE believes it is misleading for the draft report to indicate that the potential exists for future legal difficulties in the claims area without specifically elaborating on what those difficulties may be and how such claims may be made against the United States.

2. The concept of "enforcement" of living pattern restrictions is foreign to past thinking in the development of cleanup and rehabilitation criteria and recommendations for Enewetak. DOE has not required the Trust Territory government or the Enewetak people to give "unqualified assurances" of compliance with restrictions. The radiological criteria and recommendations set forth by AEC anticipated the existence of a spirit of cooperation among those who are trying to help the Enewetak people return to their homeland and that the people themselves and their advisors would cooperate. It was expected that the recommended restrictions themselves, and to some extent the need for restrictions, would be understood by the people.

The Enewetak Environmental Impact Statement (EIS) provided the mechanism for obtaining agreement from all parties. Absolute compliance with restrictions was not expected. Rather, it was anticipated that over the long term the people would police themselves and a good level of compliance with restrictions would be achieved. It was expected that at least initially there would be a high level of compliance with recommendations on housing construction and planting of food crops because these would be done by U.S. agencies. The safeguard for the long term would be the radiological followup of the people and their environment, to be performed by DOE. This will provide the necessary assurance that restrictions were being followed to an acceptable degree.

3. DOE has not changed the radiological protection philosophy used or made more stringent any of the recommended radiological criteria developed therefrom for planning and conducting cleanup and rehabilitation of Enewetak. The development of the soil cleanup criteria, i.e., the 40 and 400 pCi/g, was based upon consideration of all

transuranium elements in soil, not just Pu-239, 240, and using a conservative application of Federal standards. The consideration of all of these long-lived alpha emitters was not stressed in the AEC Task Group's report and the report used the term "plutonium" rather than "transuranium elements." This point was cleared up in discussions with DNA staff.

The radiological criteria recommended for planning purposes for evaluation of land use options were based on a conservative application of Federal standards. These have not changed. Also, criteria recommended by AEC for soil cleanup were not changed by EPA's issuance of proposed guidelines for transuranium elements in soil. It is expected that cleanup of soil according to AEC criteria will meet the EPA guidelines.

Further interpretation of the application of the 40 to 400 pCi/g criteria (i.e., within this range), which had been left by the Task Group for a later determination, was done when requested by DNA. However, there was no change in the basic criteria. The only change has been DOE's recommendation that certain islands in the northeast of the Atoll that were to be planted with coconut, not be planted. This recommendation was based upon very recent experience at Bikini Atoll.

4. Health considerations, and the associated assessments of radiological conditions of islands, the application of recommended criteria, and the development of recommendations, must take precedence over the people's preferences in decisions on land use. While DOE supports the full participation of the Enewetak people and their advisors in decisionmaking, it would be a mistake to give the impression that they will decide where they will live and where their food will be grown. If instead of a good level of cooperation, we must assume little or no adherence to restrictions, the planning assumptions inherent in the EIS and the agreement that the people may be returned safely are voided. The Enewetak Atoll master plan contains the people's preferences regarding land use, but the actual use will depend on the degree of soil cleanup actually achieved on various islands and on a statement of permissible land usage issued by DOE in the final certification process. This certification will be based on an assessment of radiological conditions at the end of cleanup.
5. We believe that GAO consider revising the report to delete statements concerning enforcement of restrictions and instead stress the positive aspects of this project where many parties are cooperating in a long and difficult task that pushes the limits of technology and where there is no applicable precedence. We believe the statements that DOE has changed the cleanup criteria and made

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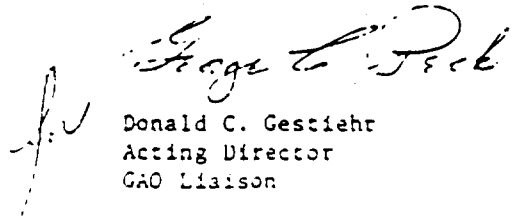
it more stringent, thereby making cleanup more difficult and expensive, should be deleted.

6. DOE would welcome an independent assessment of the radiological support that has been provided to DNA and DOI in their cleanup and rehabilitation activities at Enewetak Atoll and of DOE's plans to provide needed followup in the future, and we offer our full cooperation.

Members of your staff have been furnished comments directed at subject areas in the report where, we believe, the facts as we know them appear not to support the statements in the draft report or where our information suggests that the report may not be complete.

We appreciate your consideration of these comments in the preparation of the final report. We will also be pleased to provide any additional information you may require.

Sincerely,



Donald C. Gestiehr  
Acting Director  
GAO Liaison

Enclosure:  
Comments on GAO  
Report (Draft)

GAO note: Some of the agency comments relate to matters in the draft report which have been revised as suggested by the agency or omitted from the final report.

DOE COMMENTS ON GAO DRAFT REPORT  
"OBSERVATIONS ON THE PROJECT TO  
CLEANUP, REHABILITATE AND RESETTLE  
ENEWETAK ATOLL"

1. Page 3 - There are at least seven rather than three phases in the Enewetak project:
  - a. The initial radiological and engineering surveys and assessments conducted by DOE and Defense Nuclear Agency (DNA).
  - b. Development of cleanup criteria and recommendations by DOE.
  - c. Environmental Impact Statement (EIS) development and Project/Budget defense by DOE, DNA, and Department of Interior (DOI).
  - d. Cleanup field operations and disposal of contaminated debris conducted by DNA with radiological support provided by DOE.
  - e. Housing and agricultural rehabilitation performed by DOI with logistics support from DNA and technical support and advice provided by DOE.
  - f. Long-term radiological followup of the environment (except for the engineered features of the CACTUS Crater encrymptment of contaminated debris on Runit but including monitoring of any effluent from the crypt) and residents of the atoll by DOE.
  - g. Engineering followup of CACTUS Crater debris disposal on Runit by DNA.
2. Page 3 - The idea of enforcement of restrictions upon Enewetak residents is foreign to AEC/ERDA/DOE thinking and we have never used the concept or the term. Recommendations for restrictions on land and food use at Enewetak have been made with the expectation that there will be a spirit of cooperation and a good level of compliance by the people. If 100 percent compliance with restrictions were required in order to be able to agree that the people would be adequately protected, the resettlement should not be attempted. We suggest avoiding use of the term and the concept of "enforcement" and recommend instead that the GAO report stress the cooperation that is needed if the resettlement effort is to be successful.
3. Page 5 - The single most important recommendation of the AEC Ad Hoc Committee was that the first houses and food crops be placed on Eneu Island, the second largest island in Bikini Atoll. Compliance with this most basic recommendation was poor since 43 houses were constructed on Bikini Island at the insistence of the Bikini people and 85,000 coconut trees were planted on Bikini and Eneu Islands. When the people returned and their radiation exposures were increasing they were told they should not eat coconuts from Bikini Island. Compliance with this precaution was poor. The Bikini experience of

lack of cooperation and failure of the restriction to control exposures is directly applicable to Enewetak. We believe that the GAO report should be more explicit as to why the Bikini resettlement effort has been interrupted.

4. Page 6 - There is a better listing of similarities and differences for Bikini and Enewetak Atolls. See Enclosure I. Comments on the DNA list follow:

Similarity, we believe, should include the statement that all islands at both atolls were contaminated. Some islands were more contaminated than others. Islands in the south at Enewetak Atoll were lightly contaminated.

Differences should state that most (but not all) tests at Bikini were conducted over water. Also, we believe a comment is needed on the material attributed to DNA that discusses the isotopic content of the contamination found on Bikini and Enewetak. Our data indicates that isotopic content of scrap and soils at these two atolls is not different enough to support the point that at Bikini contamination is principally the result of fallout and that at Enewetak contamination is significantly different due to induced radioactivity. The differences in isotopic content of contamination between islands at Bikini and Enewetak are evident but the variation between islands within the same atoll are just as large. The only really unique island in our view is Runit where chunks of Pu were deposited in surface soils in an area where safety tests with no nuclear yield were conducted. Nothing similar to this has been found at Bikini.

5. Page 9 - So far as DOE is aware, there is only one development related to living pattern restrictions at Enewetak requiring any change in DOE recommendations. This has nothing to do with debris and soil cleanup or any recent experience at Enewetak. Rather, the unacceptably high Cesium-137 body burdens of Bikini residents which resulted from lack of availability of an adequate alternative supply of imported food, and the failure of the people to comply with a recommended precaution against use of locally grown foods (particularly coconuts from Bikini Island) that could have limited and controlled intake of radioactivity, argues overwhelmingly against planting coconuts in similarly contaminated soils at Enewetak or in any soils having anywhere near the Bikini levels. As a result of this experience, DOE believed it was prudent to recommend that islands in the northeast at Enewetak that had contamination levels at or near Bikini Island levels not be planted with coconuts. Whenever the preferences of residents conflict with good radiation protection practice, DOE must strongly support the adoption of its best-judgment recommendations which are derived from adherence to radiation protection standards and good practices regardless of what the Master Plan or other earlier documents may state. Otherwise, the experience of the aborted resettlement of Bikini Atoll may be repeated.

The basic radiological survey of Enewetak was done in 1972-73 and the AEC Task Group began its work on cleanup criteria concurrently with this survey. The basic recommendations from AEC were issued in the 1974 Task Group report. This report and the information in the Enewetak Environmental Impact Statement (EIS) that was based on this report are now four years old. During that four years more radiological measurements have been made in the atoll than during all other surveys combined. We believe, therefore, it is fortunate there have not been more changes in the original AEC recommendations than the one change on planting coconuts.

6. Page 10 - We suggest, as an alternative to emplacement of the slurry and radioactive debris in a crater on Runit Island, that consideration be given to disposing those wastes in the ocean. We believe that the Environmental Protection Agency (EPA) is in the process of issuing related guidelines.
7. Page 12 through 14 - We believe that these pages contain errors in fact and some of the conclusions drawn are not supportable as follows:

Item a - The only development requiring a modified solution was the Bikini experience which led DOE to recommend against planting coconuts on the northeastern islands. There has been no other change in land use recommendations or living patterns restrictions from DOE. This item was covered in earlier comments addressing material on Page 9 of the GAO draft.

Item b - DOE philosophy relative to radiological cleanup and rehabilitation of Enewetak Atoll and recommended radiological criteria for cleanup were fixed with the issuance of the AEC Task Group report in 1974. There has been no need for a change in either of these. AEC's approach, and DOE has followed the same, has been to view this project as a practical problem in radiological protection, not an engineering task. Thus, the philosophy used is the philosophy associated with current radiation protection standards that are issued to guide Federal agencies in their radiation protection activities. DOE cannot unilaterally change the philosophy or the basic numerical standards that have been derived therefrom.

In applying Federal standards, the Task Group selected 50 percent of the annual doses for individuals in the general public and 80 percent of the 30-year dose for the population for use in evaluating land use options and for planning. This was done because of the many uncertainties in making such dose predictions. For cleanup of soil, the best available information indicated that at an average soil level of 400 pCi/g, exposures of people living in the area through all pathways (air, food, water) may reach the Federal standards. The Task Group selected 40 pCi/g or 10 percent of the 400 pCi/g value

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as the level below which soil cleanup would not be required. None of these planning criteria have been changed or made more stringent. DOE will use the full value of Federal standards for individuals in the population to evaluate post-cleanup radiological conditions at Enewetak Atoll.

DNA objected to the Task Group approach in developing recommendations on cleanup criteria and developed recommendations of their own. Their concern was that if those criteria were set as low for cleanup of Enewetak as those under consideration a precedent would be set that may be difficult to meet elsewhere.

As to the indefinite quarantine of islands, to our knowledge only one island has ever been discussed in this context. This is Runit Island. The AEC Task Group considered Runit a special case and made no recommendations for cleanup specific to that island. The selection of the mechanism and site for disposal of contaminated debris and soil was made by DNA on advice from EPA. The AEC acquiesced though up to the time of this decision we had strongly supported ocean disposal.

Item c - DOE dose estimates for planning cleanup and rehabilitation have used averages, not "worst region." This item may refer to recent dose estimates developed by DNA staff for which DOE and its contractors have provided comments. Our present intent is to use island averages in the end-of-cleanup evaluation of the Enewetak environment although we are considering development of a comparison assessment that will show the impact on dose estimates and recommendations if restrictions are not followed.

Item d - DOE has not made radiological cleanup criteria more stringent because of the EPA proposed guidelines. Sections of the draft recommendations were provided by the Task Group to EPA staff for comments and suggestions as the group's report was developed. EPA's suggestions were most helpful. EPA also participated in the review process for the Enewetak EIS which was based upon the AEC recommendations.

The AEC recommendations for cleanup of plutonium in soil were derived from basic Federal standards and therefore the recommended criteria are related to dose to man. The criteria selected for Enewetak, while expressed as concentrations of radioactivity in soil, are related to dose. The proposed EPA criteria are expressed in terms of doses to lung and bone. In applying this guidance, soil concentrations are to be derived from these doses using appropriate models for the various pathways of exposure.

It is our view that if cleanup of islands at Enewetak is accomplished according to the Task Group criteria, and the residents generally



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comply with restrictions, their exposures to transuranium elements will meet the proposed EPA criteria. The published EPA proposal mentions Enewetak cleanup but does not make any recommendations specific to this project.

Item e - The statement that the Task Group's radiological cleanup guidelines considered only Pu-239, 240 is incorrect. The published scientific report\* that provided the key information relating concentration of long-lived alpha radioactivity in soil to dose to man contains the assumption that there will be a distribution or mixture of such alpha emitters in the soil containing all those transuranium elements that would be expected from a nuclear weapon detonation. The AEC report used the term plutonium or plutonium-239, 240 when it should have used the term transuranium elements. This point was clarified with DNA before soil removal began.

Item f - A much greater intake of coconut (about 10 times greater than used earlier) has appeared in a report prepared by DNA staff. Comments from DOE to DNA have raised serious questions about the validity of such an assumption. We are not aware of the status of the report and whether it is to be published.

Item g - The 40 and 400 pCi/g criteria recommended for use in decisions on cleanup of contaminated soil at Enewetak have not been changed or made more stringent since the Task Group report was issued in 1974. In the EIS, soil levels below 40 pCi/gm were judged not to require cleanup. This is still our recommendation. It was recommended in the EIS that soils having greater than 400 pCi/gm should be cleaned up wherever these levels were found. This is also still our recommendation. The value of 400 pCi/g is to be used by DNA in the cleanup of the Aomon crypt. Islands having soil concentrations in between these values (from 40 to 400 pCi/gm) were to be treated on a case-by-case basis. DNA requested and received additional advice on how to make these case-by-case decisions. They have not requested any further advice regarding soil cleanup criteria.

8. Page 19 - DOE is committed to perform long-term radiological follow-up of Enewetak residents and their environment including monitoring any effluent from the disposal of contaminated debris and soil on Runit Island. This does not include monitoring or inspection of the engineered features of the entombed debris in CACTUS Crater which was designed and constructed by DNA. Disposal of contaminated debris is a DNA responsibility and any followup on containment structures created for this purpose would be done by that agency.
9. Pages 21 and 25 - DOE would welcome an independent assessment of the radiological support that has been provided to DNA and DCI for

\* LA-5483-MS, "A Proposed Interim Standard For Plutonium In Soils," January 1974.

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the Enewetak project and of DOE's plans to provide needed followup. An independent laboratory verification of soil analysis would receive our full cooperation.

10. Page 23 - For comments on the EPA proposed guidelines for trans-uranium elements in soil, see comments on item 7d above.
11. We believe that one final comment is needed to explain and clarify DOE's position on cleanup of Enewetak Atoll. This position can be stated simply in the form of one "fact" and three "premises":

Fact. Enewetak Atoll cannot be cleaned up radiologically to its original condition.

Premise. The term "safe", as used by DOE relative to questions about radiological conditions at Enewetak, i.e., can the Atoll be made safe for the people to return, means that predictions of radiation exposures of people who will return to live in the Atoll, and later the actual exposure associated with this return, will be judged safe or unsafe on the basis of current Federal radiation protection standards. Standards applicable to exposure of individuals in the population, as opposed to an average for the population, will be used.

Premise. Exposures of the returning population can be controlled through a combination of cleanup actions by the Federal Government and adherence to restrictions on land use by the returning people.

Premise. As a safeguard, exposures of those who return will be determined through a long-term followup program.

Enjebi Island may be used as an example of where this position had led in the development of recommendations and restrictions. It was recommended to DNA that Enjebi Island be given highest priority and that it be cleaned up such that it meets the criteria for a village island for transuranium elements in soil. The trans-uranium element cleanup of Enjebi was required if the people are ever to return to live there because of the extremely long half-lives of these radionuclides (thousands of years). A complete cleanup of Enjebi, including fission product contamination, while considered, was not possible because this would require removal and disposal of a very large volume of soil.

By comparison, the fission products of concern on Enjebi will decay much more rapidly because they have much shorter radiological half-lives - about 30 years. Through this radioactive decay which is known and fixed, and through other weathering processes which we are trying to understand and evaluate, the fission product contamination on Enjebi will be reduced with time. We do not yet know how long reduction to acceptable levels will take. Certainly not

APPENDIX II

APPENDIX II

less than 10 years, more likely 30 to 100 years. We recognize this as one of the most important and most difficult technical questions to be addressed, and are working to get the answer.

The Enjebi people were briefed in 1974 and informed that their island could not be cleaned up so that they could return to live there. This restriction was stated in the EIS. Following this briefing, AEC (now DOE) agreed to conduct the necessary research to determine when a return to Enjebi can be recommended. The next year, garden test plots were established on Enjebi and on Eneu Island at Bikini Atoll. This research has therefore been underway about 3 years. Meanwhile, experience with people living on Bikini Island, an island having contamination levels very similar to Enjebi, reinforces the earlier recommendation that transuranium element contaminated soil on Enjebi should be cleaned up but that the island must not be used for housing and food production in the near future.

12. Page 26 - We believe that EPA would be an appropriate organization to provide guidance with regard to the possible ocean disposal of the radioactive debris at Enewetak. The EPA is developing ocean disposal guidelines and has a related research and development project. It is possible that our proposed ocean disposal could be incorporated in that research and development project.

## ENCLOSURE I

BIKINI-EHEMETAK  
SIMILARITIES

ABOUT SAME NUMBER OF PEOPLE INVOLVED.  
NUCLEAR TESTS IN SAME GEOGRAPHIC LOCATIONS.  
NUCLEAR TESTS ABOUT THE SAME TIME PERIOD.  
LARGEST ISLAND IN SOUTH AND LIGHTLY CONTAMINATED.  
LARGE AREAS SUBJECTED TO LAND CLEARING.  
MANY BUNKERS AND CONTAMINATED SCRAP.  
MOST COCONUT AND OTHER FOOD PLANTS ARE MISSING.  
FISH AND SHELLFISH HAVE LOW RADIOACTIVITY.  
TERRESTRIAL FOODS HAVE THE HIGHER LEVELS OF  
RADIOACTIVITY.  
LAGOON WATER HAS VERY LOW RADIOACTIVITY LEVELS.  
DIET AND LIVING HABITS OF THE PEOPLE ARE ABOUT  
THE SAME.  
BASIC RADIATION STANDARDS ARE THE SAME.

## BIKINI DIFFERENCES

AT BIKINI - ELEVEN SHIPS ON LAGOON FLOOR.

GILLIAM	SAKAWA	PILOTTISE
ANDERSON	ARKANSAS	SKIPJACK
CARLISLE	SARATOGA	APOGON
LAMSON	NAGATO	

AT BIKINI - CLEANUP AND REHABILITATION ACTION IN 1969.

AT BIKINI - FIRST 40 HOUSES BUILT, SOME OCCUPIED.

AT BIKINI - ALL NUCLEAR CRATERS UNDERWATER.

AT BIKINI - NO AREAS OF HIGH LEVEL PLUTONIUM IN SOIL.

AT BIKINI - PEOPLE TRADITIONALLY LIVED IN VILLAGE ON BIKINI ISLAND IN SOUTH OF ATOLL.

AT BIKINI - NO EXISTING FACILITIES. TENT CAMP IN SOUTH BUILT FOR CLEANUP. CLEANUP IN 8 MO. LITTLE WORLD WAR II DEBRIS.

## ENEWETAK DIFFERENCES

AT ENEWETAK - SAFETY TEST CONDUCTED (NO NUCLEAR YIELD).

AT ENEWETAK - NUCLEAR CRATERS ON LAND.

AT ENEWETAK - AREAS OF HIGH LEVEL PLUTONIUM IN SOIL.

AT ENEWETAK - ALMOST TWICE AS MANY TESTS AS BIKINI (42/23).

AT ENEWETAK - CLEANUP AND REHABILITATION NOT YET DONE.

AT ENEWETAK - PEOPLE LIVED IN TWO GROUPS, ONE IN SOUTH AND ONE IN NORTH OF ATOLL.

AT ENEWETAK - NEPA/EIS REQUIREMENTS.

AT ENEWETAK - OCEAN DUMPING LEGISLATION.

AT ENEWETAK - INCREASED CONSERVATISM IN APPLICATION OF RADIATION PROTECTION STANDARDS.

AT ENEWETAK - INCREASED CONCERN FOR PLUTONIUM.

AT ENEWETAK - MICRONESIAN LEGAL SERVICES CORP, INVOLVEMENT.

AT ENEWETAK - NO JTF-8. CLEANUP MAY TAKE TWO YEARS. SOME WORLD WAR II DEBRIS.

AT ENEWETAK - EXISTING BASE CAMP IN SOUTH NEEDS MUCH UPGRADING.



## DEPARTMENT OF STATE

WASHINGTON, D. C. 20520

January 10, 1979

Mr. J. K. Fasick  
Director  
International Division  
U. S. General Accounting Office  
Washington, D. C.

Dear Mr. Fasick:

I am replying to your letter of November 29, 1978, which forwarded copies of the draft report: "Observations on the Project to Cleanup, Rehabilitate and Resettle Enewetak Atoll."

The enclosed comments on this report were prepared by the Deputy Assistant Secretary for the Bureau of East Asian and Pacific Affairs.

We appreciate having had the opportunity to review and comment on the draft report. If I may be of further assistance, I trust you will let me know.

Sincerely,

A handwritten signature in cursive script, reading "Roger B. Feldman".

Roger B. Feldman  
Deputy Assistant Secretary  
for Budget and Finance


Enclosure: As stated

GAO DRAFT REPORT"Observations on the Project to Cleanup,  
Rehabilitate and Resettle Enewetak Atoll

The Department of the Interior administers the Trust Territory of the Pacific Islands, including Enewetak Atoll. The State Department has not become directly involved in the cleanup projects for Bikini or Enewetak which are the joint responsibility of the Department of Defense, Energy and Interior. The State Department does, however, take an active role in the political status negotiations with the Micronesians.

The issue of post-trusteeship liability and claims resulting from the US nuclear testing program has been raised in the status negotiations. Detailed provisions have not yet been discussed and it is impossible at this time to determine what degree of detail the US-Micronesian Compact of Free Association will contain on this subject. It is likely that the Marshall Islands representative at the negotiations will seek rather far-reaching assurances in this matter.

The Department of State will take into account the recommendations contained in the GAO draft report in the status negotiations.

  
Evelyn Colbert  
Deputy Assistant Secretary